

Filamentous Trichomic Prokaryotes in Carbonaceous Meteorites: Indigenous Microfossils, Minerals, or Modern Bio-Contaminants?

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ABSTRACT

Large complex filaments have been detected in freshly fractured interior surfaces of a variety of carbonaceous meteorites. Many exhibit the detailed morphological and morphometric characteristics of known filamentous trichomic prokaryotic microorganisms. In this paper we review prior studies of filamentous microstructures encountered in the meteorites along with the elemental compositions and characteristics of the, fibrous evaporite minerals and filamentous cyanobacteria and homologous trichomic sulfur bacteria. The meteorite images and elemental compositions will be compared with data obtained with the same instruments for abiotic microstructures and living and fossil microorganisms in order to evaluate the relative merits of the alternate hypotheses that have been advanced to explain the nature and characteristics of the meteorite filaments. The possibility that the filaments found in the meteorites may be comprise modern bio-contaminants will be evaluated in light of their observed elemental compositions and data by other researchers on the detection of indigenous complex organic biosignatures, and extraterrestrial amino acids and nucleobases found in the Murchison CM2 and the Orgueil CI1 carbonaceous meteorites.

Keywords: Carbonaceous Meteorites, Biosignatures, Nucleobases, Amino Acids, Fibrous Minerals, Microfossils

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